



*BE-IR30 / 31*

# **Infrared B/W Camera Module Operation Guide**

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Please read this operation Guide carefully for proper operation, and keep it for future reference.

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**Hitachi Kokusai Electric Inc.**

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## 1. Introduction

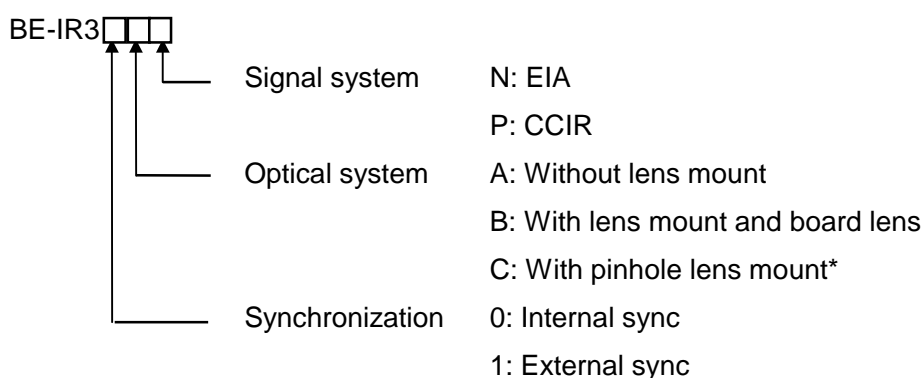
Thank you very much for your purchase of the Hitachi BE-IR30/31 Black and White Camera Module.

Prior to using this camera , read this manual carefully.

## 2. General

The BE-IR30/31 is a monochrome camera module featuring sensitivity in the near infrared spectrum using a 1/3-inch size CCD imaging device. Resolution is outstanding, while the very small size provides optimum suitability for incorporation into equipment where space is limited.

Model coding



\*Type C is mount only. Specify at time of order when requiring pinhole lens, CS or C mount adapter

## 3. Composition

- 1) Black and white camera module ..... 1
- 2) Interface cable ..... 1

Note : The standard accessory cable is 300 mm signal conductor.

Different length cable requires shielding to avoid external noise.

## 4. Specifications

1) Imaging device	1/3 inch interline CCD
No. of pixels	EIA : 811(H) × 508(V) CCIR : 795(H) × 596(V)
No. of effective pixels	EIA : 768(H) × 494(V) CCIR : 752(H) × 582
Pixel pitch	EIA : 6.35(H) × 7.4(V)μm CCIR : 6.5(H) × 6.25(V)μm

2) Sensing area	EIA : 6.00(H) × 4.96(V)mm CCIR : 6.00(H) × 4.96(V)mm
3) Signal format	Conforming to EIA or CCIR.
4) Scanning system	2:1 interlaced
5) Hor. scanning frequency	EIA : 15.734 kHz CCIR : 15.625 kHz
6) Vert. scanning frequency	EIA : 59.94 Hz CCIR : 50 Hz
7) Sync system	BE-IR30 : Internal sync BE-IR31 : External sync
8) External sync input	HD & VD : 5V peak-to-peak negative Input impedance : 1kΩ Frequency deviation : ±1%
9) Video output	1.0 Vp-p, 75Ω, unbalanced Video component : 0.7 Vp-p Sync component : 0.3 Vp-p negative
10) Resolution	EIA : 570(H) × 380(V) TV lines CCIR : 560(H) × 380(V) TV lines
11) Signal to noise ratio	56 dB
12) Auto electronic shutter	Provided (factory setting OFF)
13) Automatic gain control (AGC)	Max. 32 dB approx. Fixed gain(factory setting)
14) Integration mode	Field integration mode
15) Gamma correction	0.45 0.45ON (factory setting) or 1.0 Selected by changing chip parts
16) Sensitivity	30 lux , F4, 3200k
17) Minimum illumination	0.3 lux , F1.4 , AGC and gamma on
18) Power supply voltage	9 ± 0.5 VDC
19) Power consumption	Approx. 150mA
20) Ambient conditions	Operating : -5 to 45 , 90% RH or less Storage : -10 to 60 , 70% RH or less

**21) Standard lens**
**f3.8 (BE-IR30B/31B only)**

Focal distance f		3.8 mm
F value		2.0
Picture angle	H	70.9
	V	52.9

**21) Dimensions**
**BE-IR30A/31A: 34 (W) × 34 (H) × 20 (D) mm**
**BE-IR30B/31B: 34 (W) × 34 (H) × 32 (D) mm**
**(less lens)**
**BE-IR30C/31C: 34 (W) × 34 (H) × 24 (D) mm**
**22) Mass**
**BE-IR30A/31A: Approx. 15g (less cable)**
**BE-IR30B/31B: Approx. 26g (including cable, less lens)**
**BE-IR30C/31C: Approx. 19g (less cable)**
**23) Options**

- BE-IR30B/31B lenses

- BE-IR30A/31A mount adapter (LA-IR20)

Focal distance f (mm)		2.5	6.0
F value		2.0	2.0
Picture angle	H	117.9	45.5
	V	85.3	33.8

- BE-IR30C/31C pinhole lenses

Focal distance f (mm)		3.2	3.7
F value		4.5	4.5
Picture angle	H	90.6	72.6
	V	56.9	54.2

- BE-30C/31C CS mount adapter

**BE-30C/31C C mount adapter**
**(use together with CS mount adapter)**
**NOTE**
**Auto electronic shutter**

This is normally set to off at the factory.

If using a board lens (type B or C), the auto electronic shutter can be supplied from the factory at the on setting. Since changing the setting is somewhat troublesome (requires tools and technical skill for working with miniature parts) whenever possible, specify desired on or off setting at time of order.

Also note that certain types of lighting (e.g., fluorescent or mercury vapor) may cause flicker to appear on the monitor screen due to effects of power line frequency.

## 5. Notes to users

### ◆ Power supply

- Connect a 9V DC voltage (8.5 to 9.5V) from an external regulated DC power supply.
- Use a stable power supply without ripple and noise.
- Prior to turning on the power switch , check that the polarities of the power cable are correct , referring to the connection diagram (Page 11 , 12)

### ◆ To protect CCD (sensor)

- Do not touch the glass surface of the CCD sensor to avoid deterioration in picture quality due to dirt and scratches.
- If the glass surface of the sensor should become dusty or dirty , remove dust or dirt carefully with a cotton-tipped applicator. Do not wipe the surface with dry cloth or paper tissue to avoid possible damage to the glass surface by static electricity.

### ◆ Protection of camera

- Do not use or store the camera under direct sunlight , at a place exposed to rain or snow , or at a place where flammable or corrosive gas is present.
- When housing the camera in a camera case , use the utmost care regarding rise of internal temperature.

When casing the camera , the temperature normally rises by 10 to 20 , compared with the outside air temperature. The camera operates in the temperature range from -5 to 45 . If the camera is used or left in high temperature environment for hours , the life of the camera may be shortened.

- Do not drop the camera. Do not apply strong shock or vibration to the camera.
- Before connecting or disconnecting a connector , turn off the camera and be sure to hold connector body to connect or disconnect the connector.

### ◆ Camera arrangement

- Mutual interference noise can occur if multiple cameras are arranged in close proximity. Separate the cameras to the extent possible.

When camera units are installed directly into other equipment , external noise can prevent a normal picture. In such cases , shield the camera units.

The camera can be damaged by static electricity. Use ample care when installing and arranging.

### ◆ Auto electric shutter

- In regions using 50 Hz power line frequency , flicker can appear on the monitor screen from light sources such as fluorescent or mercury. In such cases , release the auto electronic shutter.

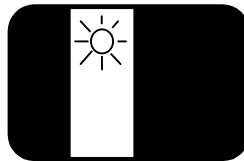
◆ Phenomena inherent to CCD imaging device

Following are phenomena inherent to a CCD imaging device , and not defects.

- Smear and blooming

When strong light (lamp , fluorescent lamp , reflected light , etc.) is shot , pale bands are displayed vertically above and below the light.

In this case , change the angle of the camera so that such strong light does not enter the camera through the lens.



- Fixed pattern noise

When the camera is operated in a high temperature , fixed pattern noise may appear on the entire screen.

The higher the sensitivity of camera , the more this fixed pattern noise appears.

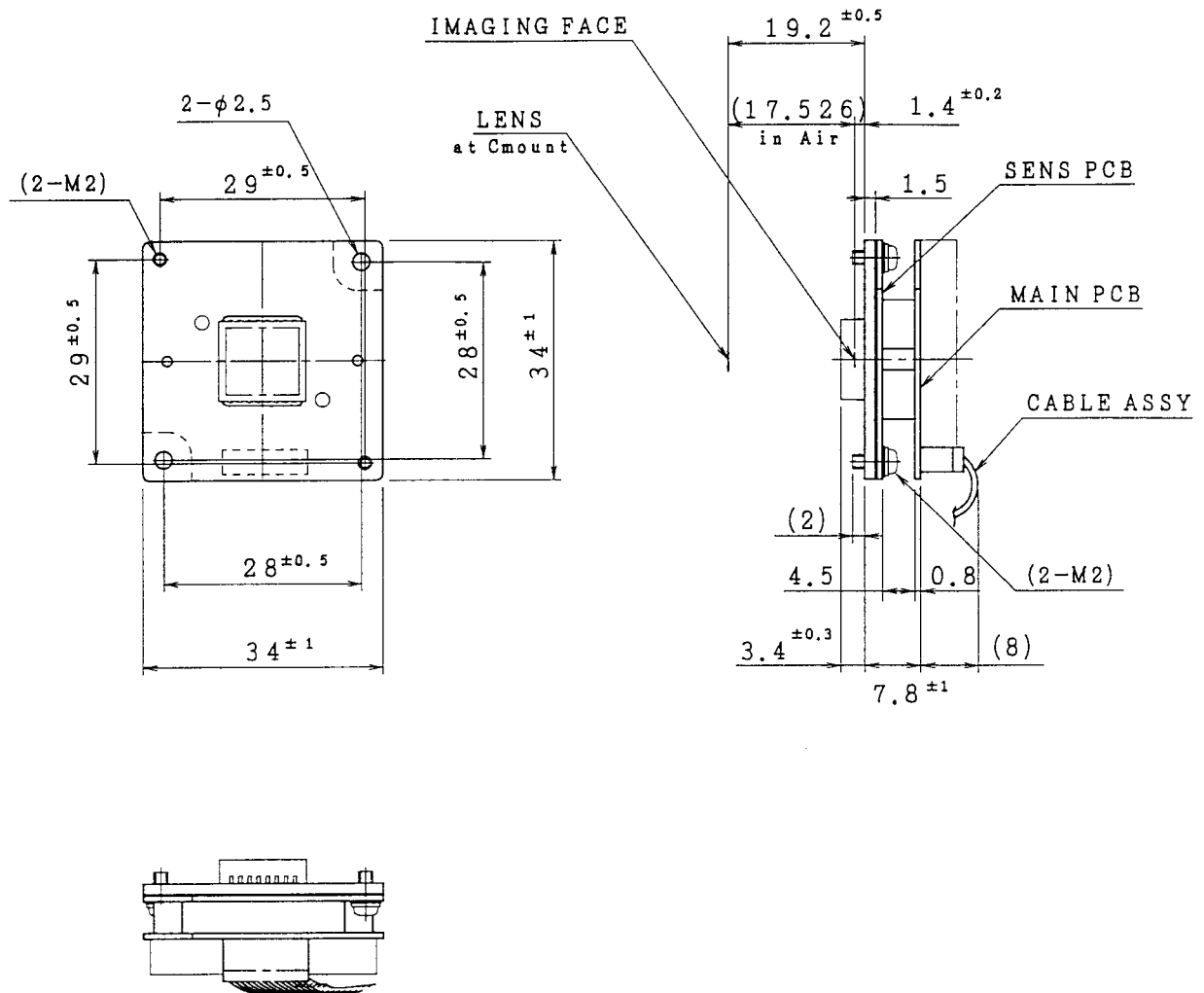
- Moire

When fine patterns are shot , moire may be displayed.

- The CE mark is required when exporting to Europe. Obtain the necessary authorization for the customer's system. Enclose the camera in a shielded case and use shielded cable.

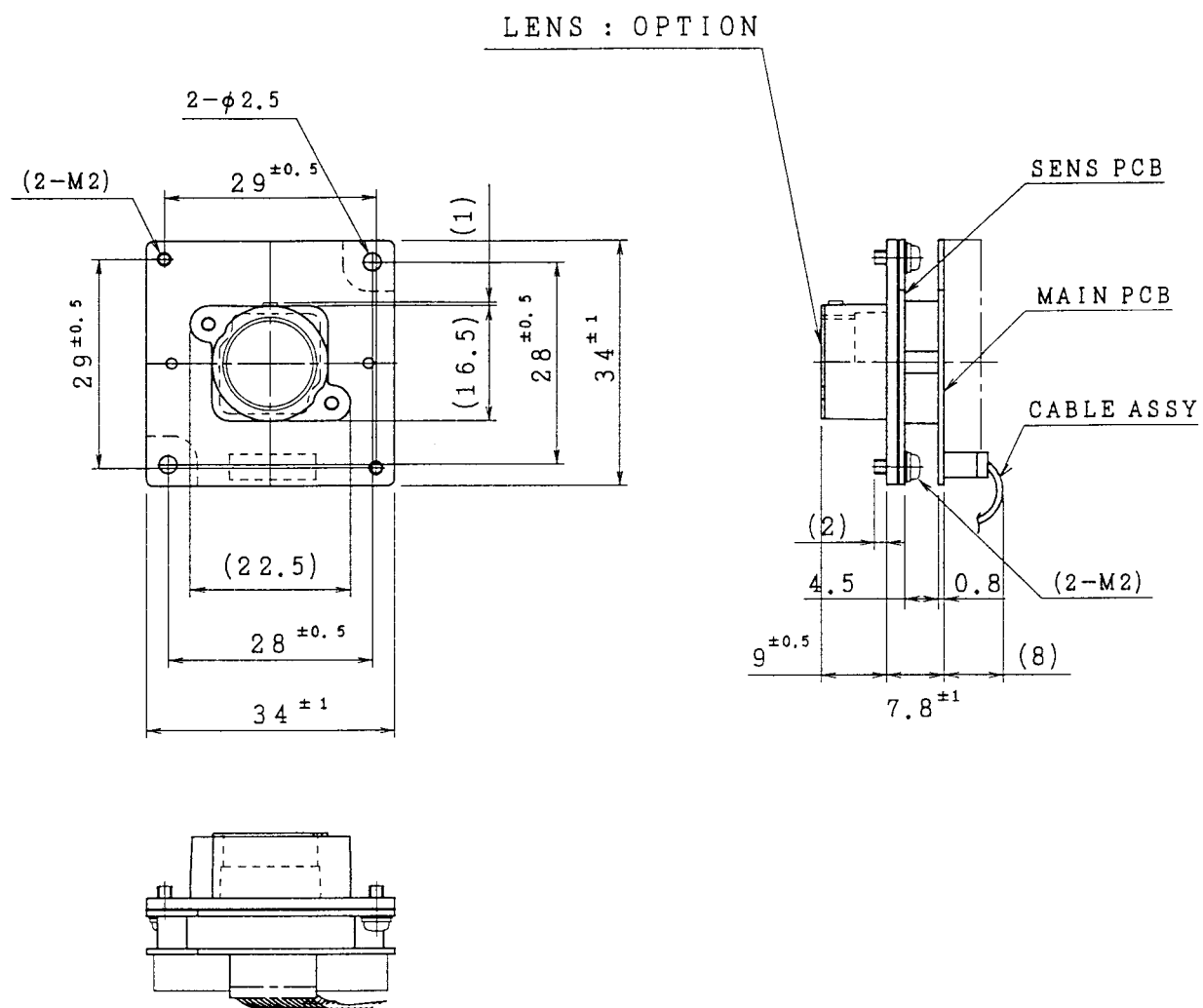
## 6. External view

BE-IR30B/31B

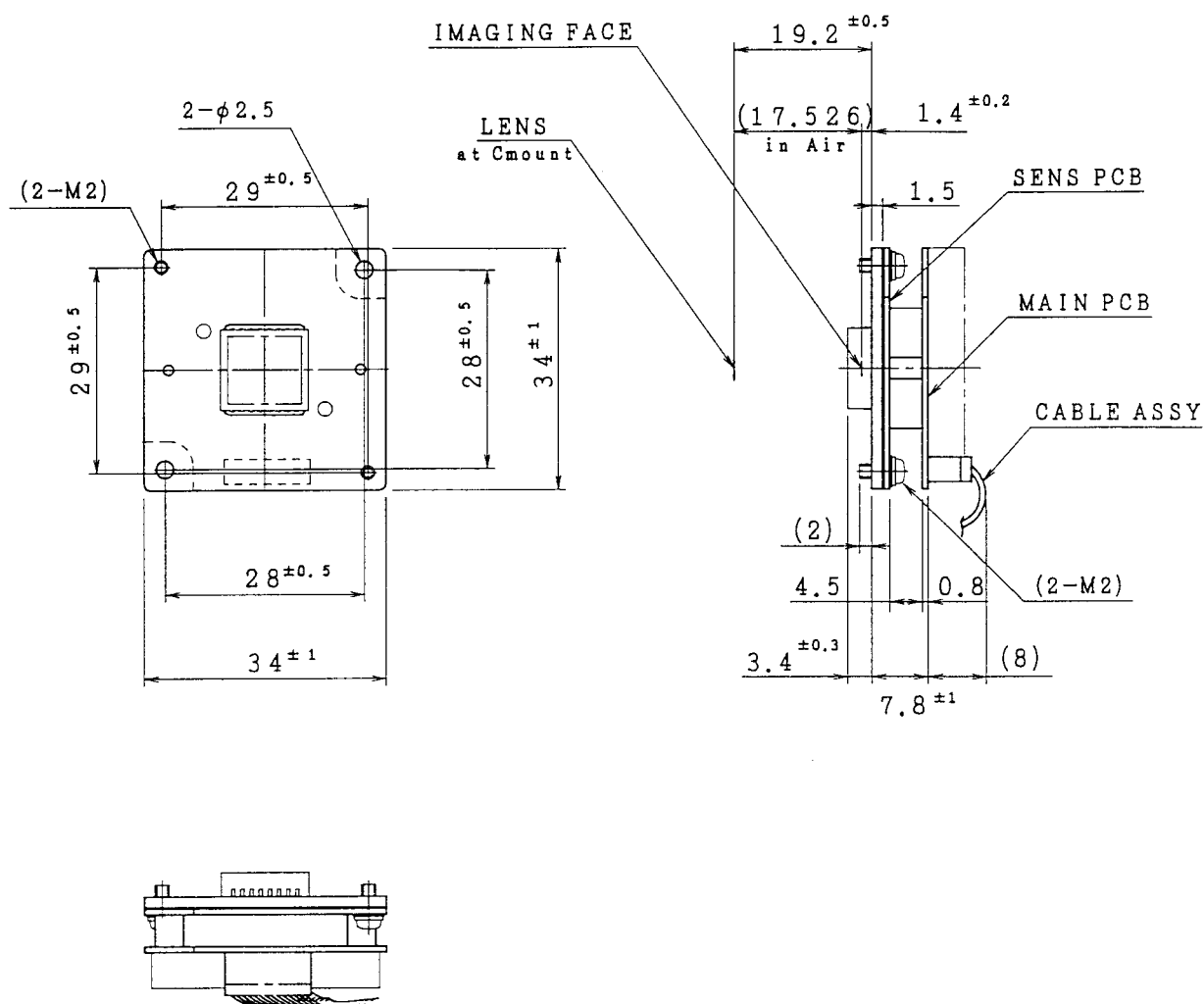




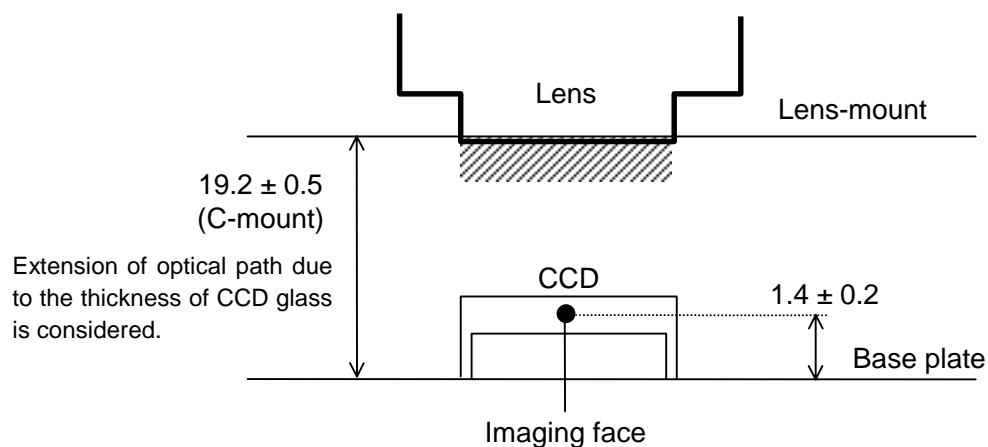
BE-IR30C/31C



BE-IR30A/31A

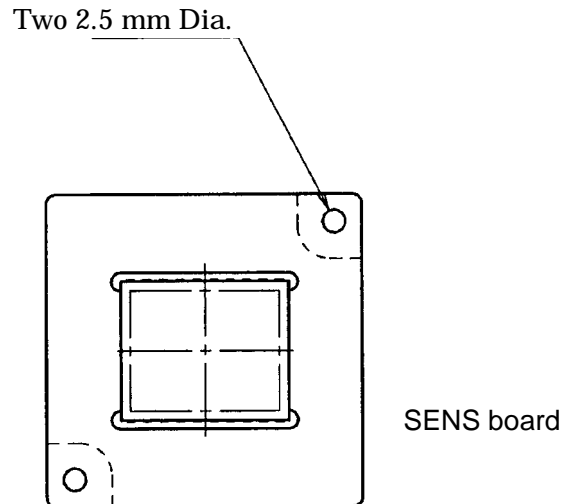


## 7. Optical dimensions

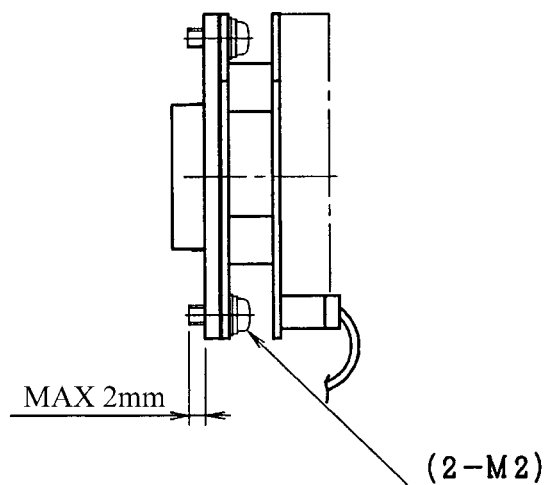


## 8. Installation

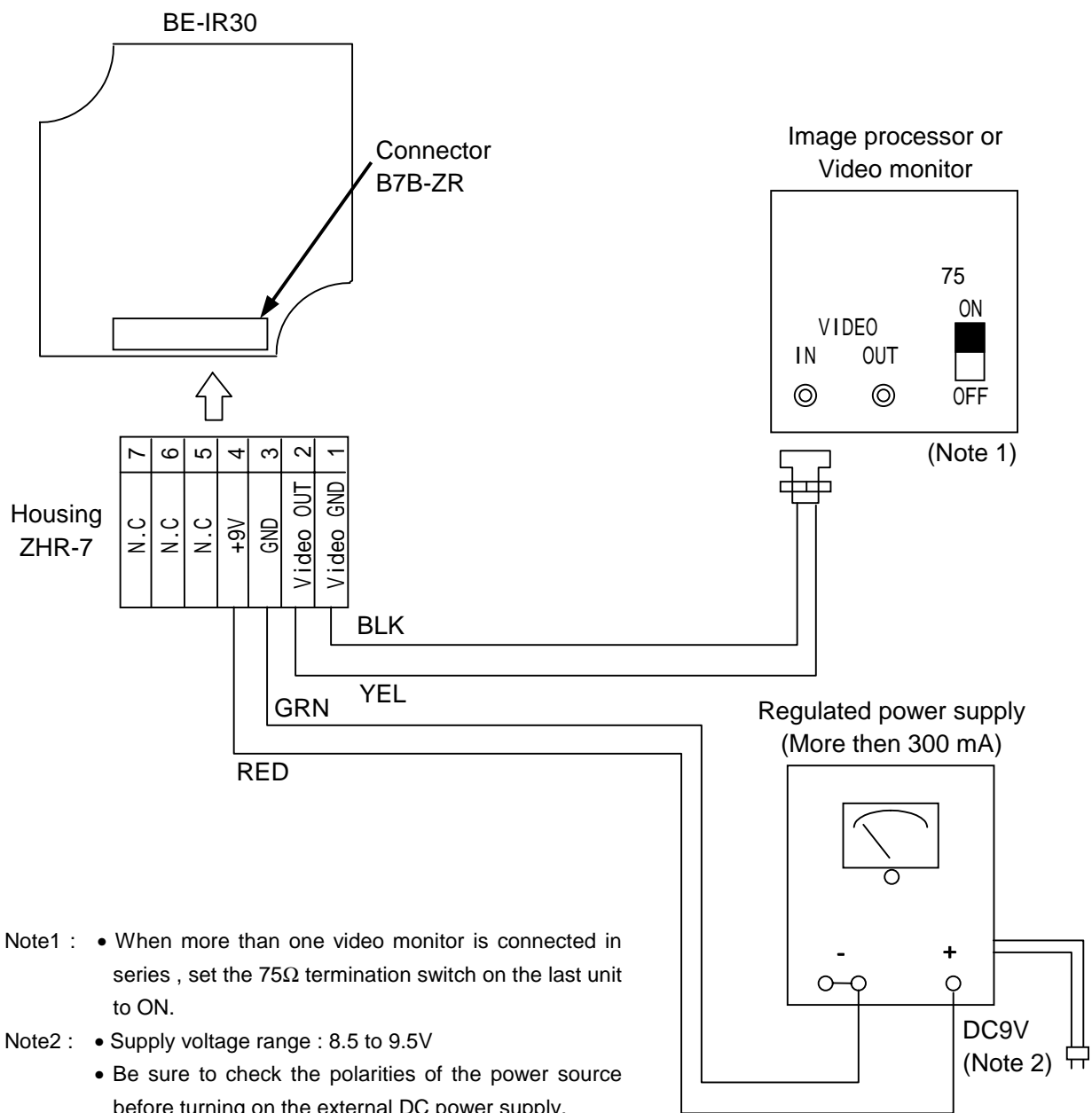
When installing the camera in a housing or unit of equipment, secure with two M2 screws inserted into the 2.5 mm diameters holes of the SENS board base plate.



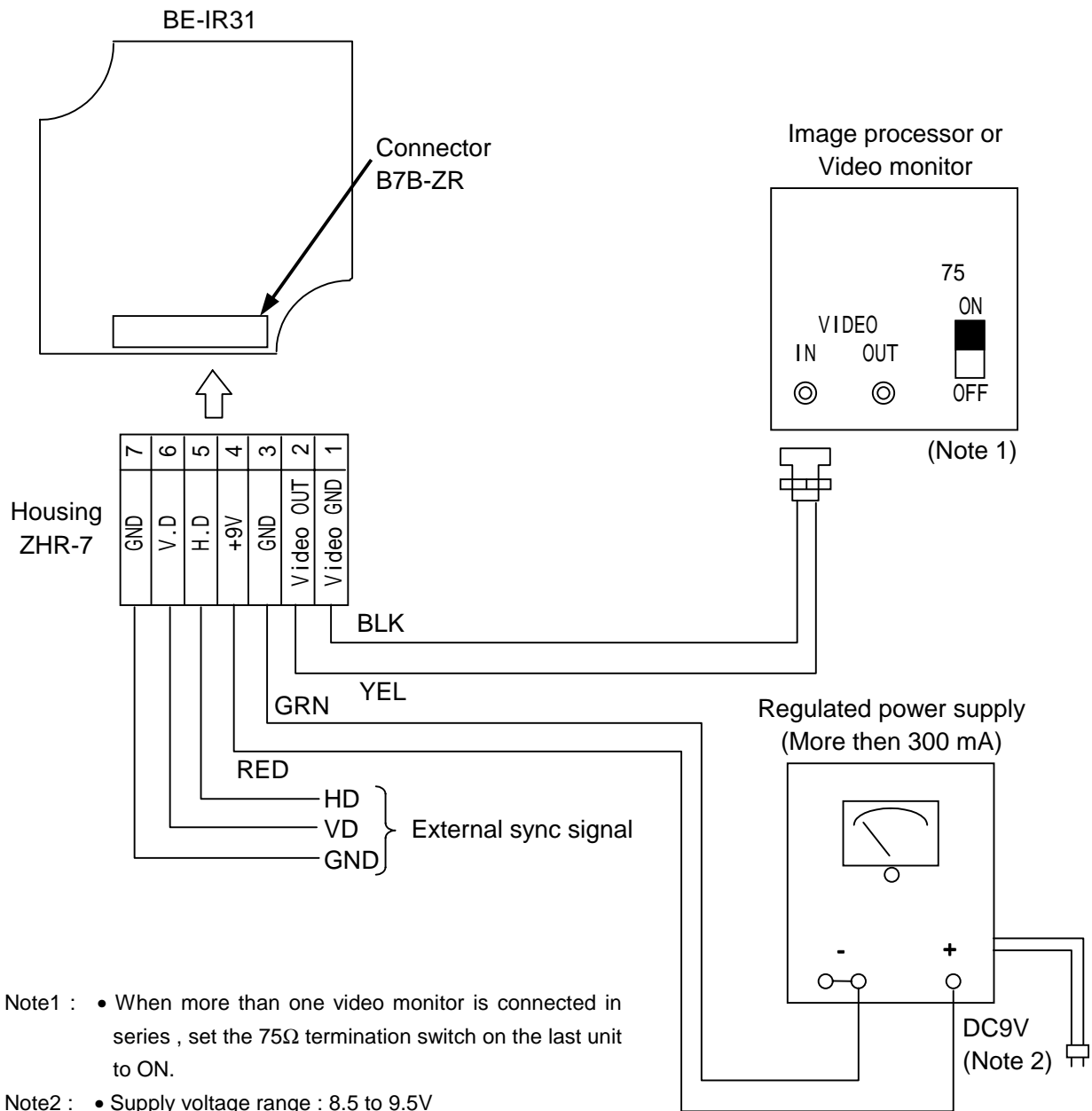
- Notes :
1. Use the SENS board holds to install the camera. Avoid using only the Main board, due to risk of damage to the board connector.
  2. Avoid unnecessary stress on the printed board when engaging and disengaging the connectors.
  3. The screws securing the base plate and SENS board protrude a maximum of 2 mm from the base plate. Observe these screws do not contact the housing or installed equipment.



## 9. Typical connection



## 9. Typical connection



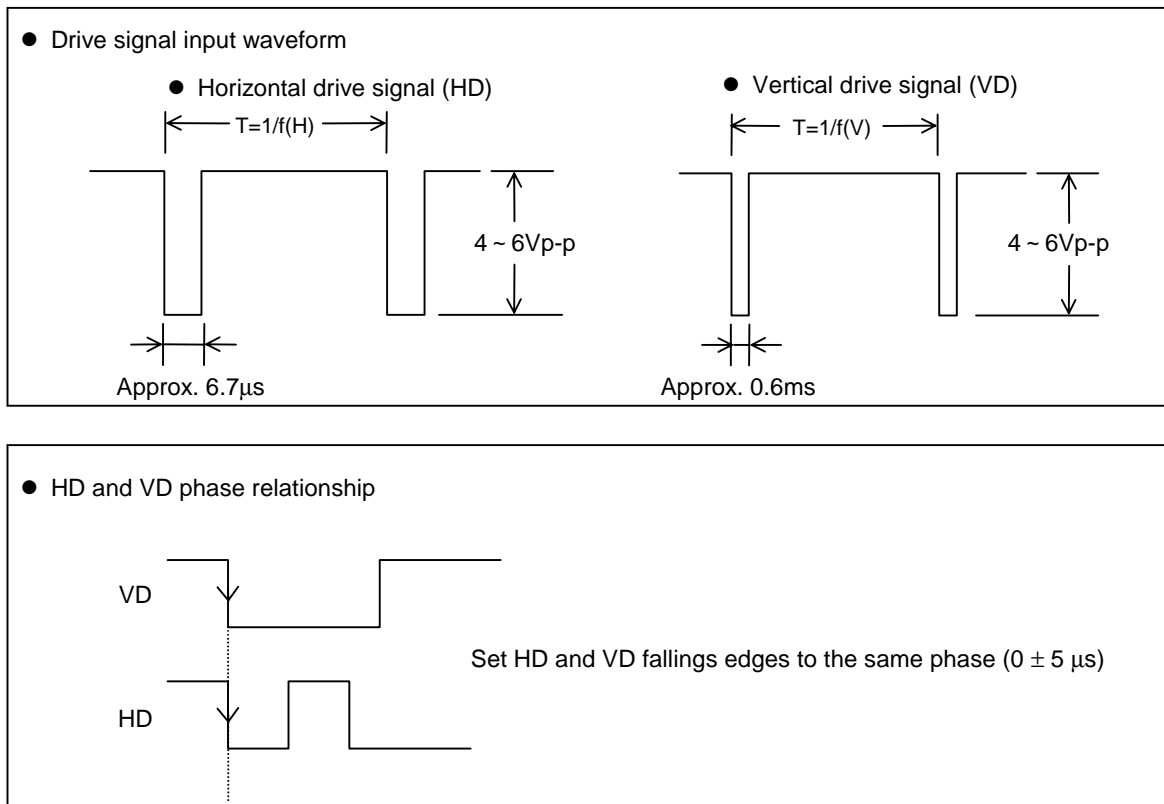
Note1 : • When more than one video monitor is connected in series , set the 75Ω termination switch on the last unit to ON.

Note2 : • Supply voltage range : 8.5 to 9.5V  
• Be sure to check the polarities of the power source before turning on the external DC power supply.

## 10. External sync (BE-IR31)

Supply sync signals (HD and VD) for BE-IR31 operation. Refer to connection on page 12.

- Horizontal and vertical drive signal inputs  
HD EIA:  $f(H) = 15.734 \text{ kHz} \pm 1 \%$   
VD EIA:  $f(V) = 59.94 \text{ Hz}$  ( $f(V) = f(H) \div 262.5$ )
- Input level  
HD 4 to 6 Vp-p negative  
VD 4 to 6 Vp-p negative
- Input impedance 1 k



## 11. Function setting and changes

When changing the function settings , perform the work with thorough care. Be sure to use anti-static measures such as a grounding band. Also observe safety precautions when soldering to avoid burn and fire hazards.

Hitachi Denshi assumes on liability for damage or injury resulting from such work.

Since the function setting can be provided at the time of shipment , consult a Hitachi Denshi representative.

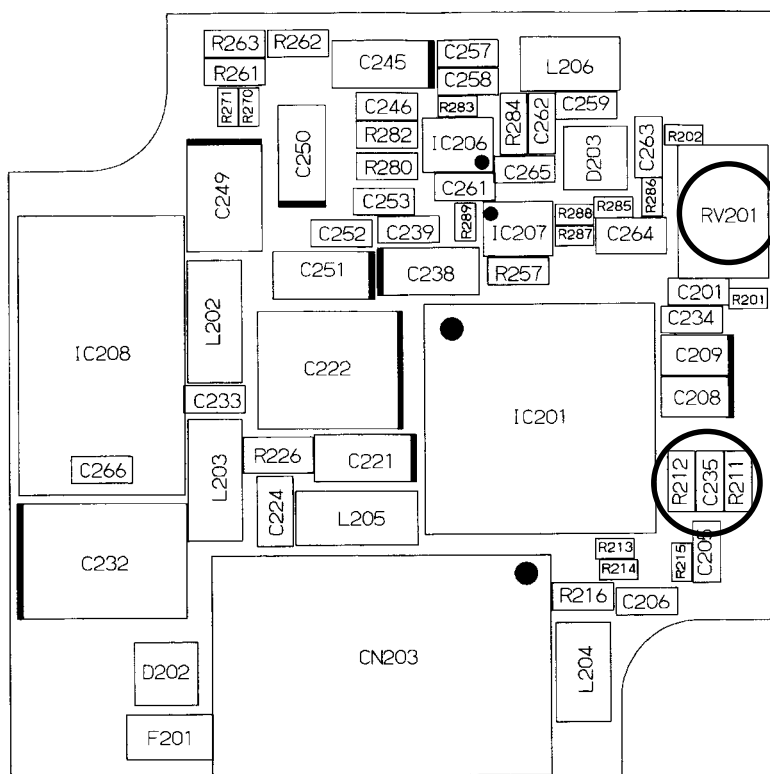
### 11-1 AGC on / off

Factory setting is AGC off (fixed gain). If necessary in the application, AGC can be set to on.

When the AGC is off, the gain can be changed by turning RV201.

Set AGC on by changing the indicated chip parts.

Gain	R211	R212	Factory setting
fixed gain	0Ω	Absent	
AGC	Remove	0Ω	



Location of chip resistor (Main board side A)

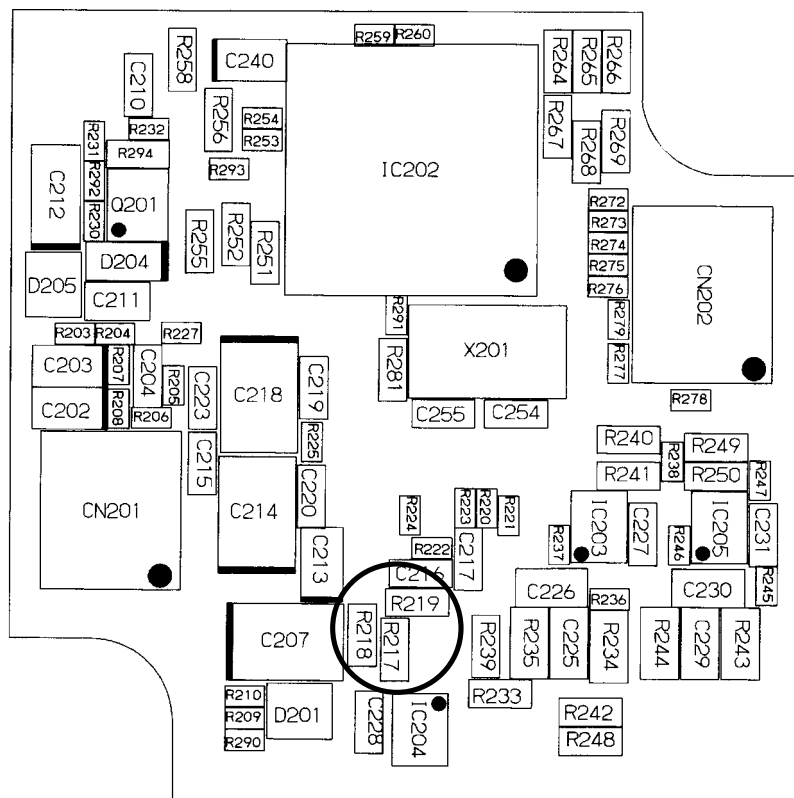
### 11-2 Gamma response

The factory setting is gamma on. If necessary, the gamma response can be changed as follows.

Change the gamma response by changing the chip part.

Gamma( $\gamma$ )response	R217	R218	R219	Factory setting
ON	Absent	0 $\Omega$	0 $\Omega$	
OFF	0 $\Omega$	Remove	Remove	

0 $\Omega$  : Part code RME1784  
Description ERJ3GEYJ0R00V



Location of chip capacitors (Main board side B)



## 11. Function setting and changes

### 11-3 Auto electronic shutter on / off

Factory setting for auto electronic shutter is off. If necessary , it can be set to on.

Absent the R259 , R260 chip to set the auto electronic shutter to on.

Auto electronic shutter	R259	R260
OFF	0Ω	0Ω
ON	Absent	Absent

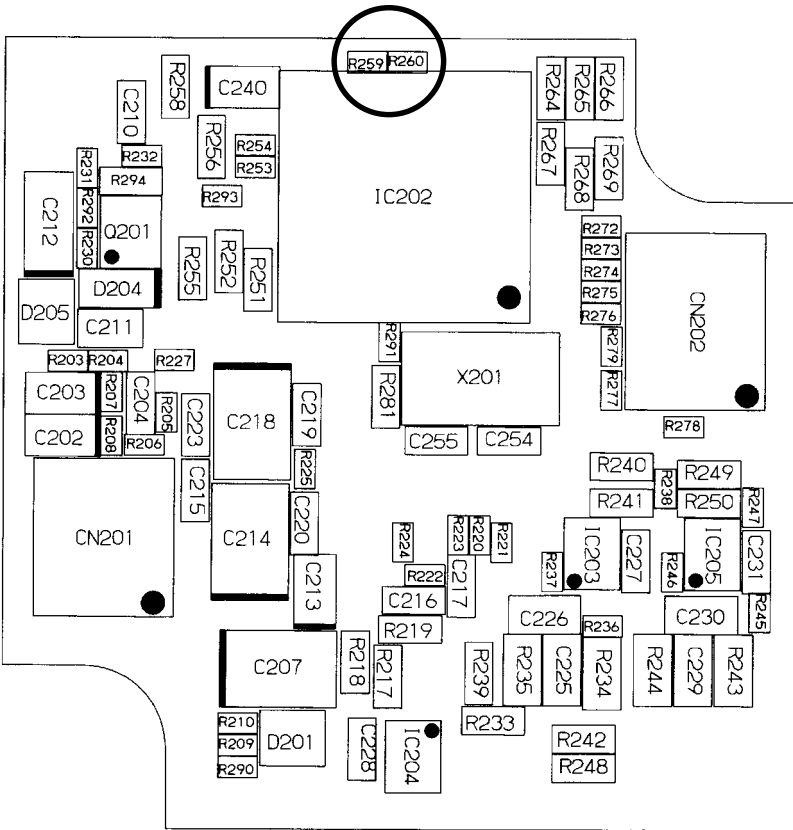
### Factory setting

0Ω : Part code

RME2068

### Description

ERJ2GE0R00X



### Location of chip resistors (Main board side B)

## 11. Function setting and changes

### 11-4 Changes to fixed shutter mode

The fixed shutter mode can be changed by replacing the chip parts indicated below.

Mode	R259	R260	R261	R262	R263	R264	R265	R266	R267	R268	R269	Factory setting
Normal mode	0Ω	0Ω	Absent	0Ω	Absent	6800	10k	27k	10k	10k	27k	
Auto electronic shutter mode	Remove	Remove	Absent	0Ω	Absent							
Fixed shutter mode	EIA											
	1/100	Remove	0Ω	0Ω	Remove	Absent	0Ω	0Ω	Remove	0Ω	0Ω	Remove
	CCIR											
	1/120											
	1/250								Remove	Remove	0Ω	
	1/500			Absent	Remove	0Ω			0Ω	0Ω	Remove	
	1/1000								Remove	Remove	0Ω	
	1/2000	↑	↑	0Ω	Remove	Absent	Remove	Remove	0Ω	0Ω	0Ω	Remove
	1/5000						↑	↑	0Ω	Remove	Remove	0Ω
	1/10000			Absent	Remove	0Ω			0Ω	0Ω	0Ω	Remove
	1/100000								0Ω	Remove	Remove	0Ω

R259 , R260 : 0Ω Part code

Description

Others : 0Ω Part code

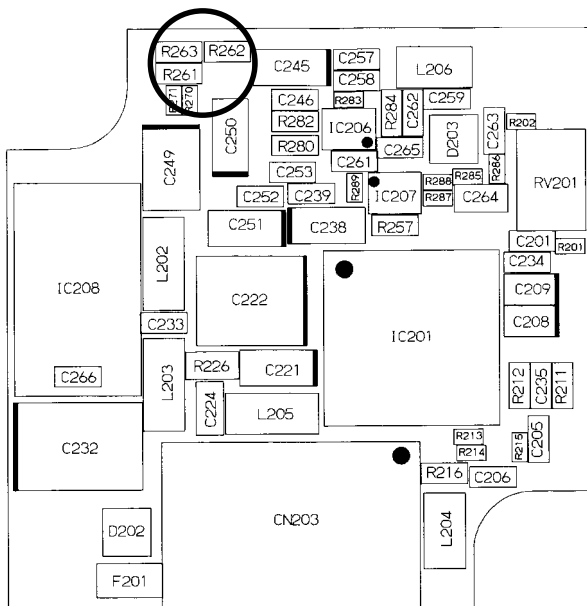
Description

RME2068

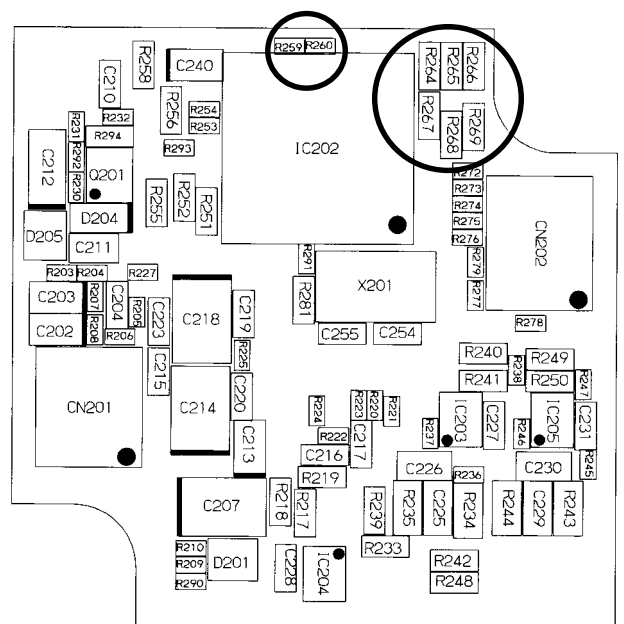
ERJ2GE0R00X

RME1784

ERJ3GEYJ0R00V



(Main board side A)



(Main board side B)

Location of chip resistors

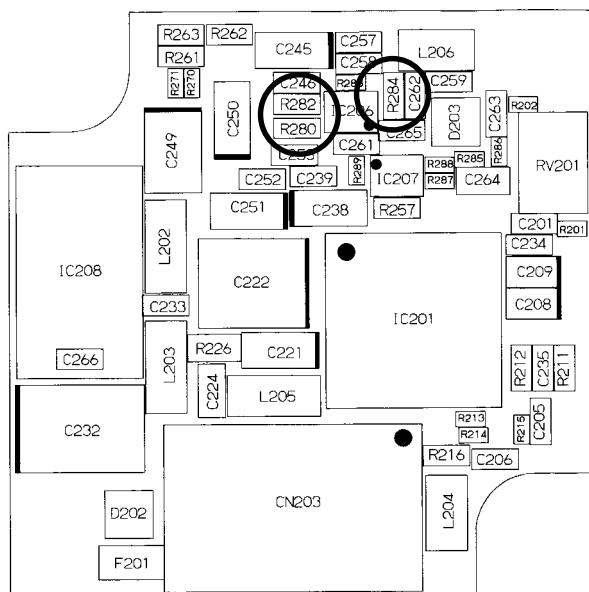
## 11-5 BE-IR30 external sync

The BE-IR30 factory setting is for internal sync. If required, this can be changed to external sync by changing chip parts.

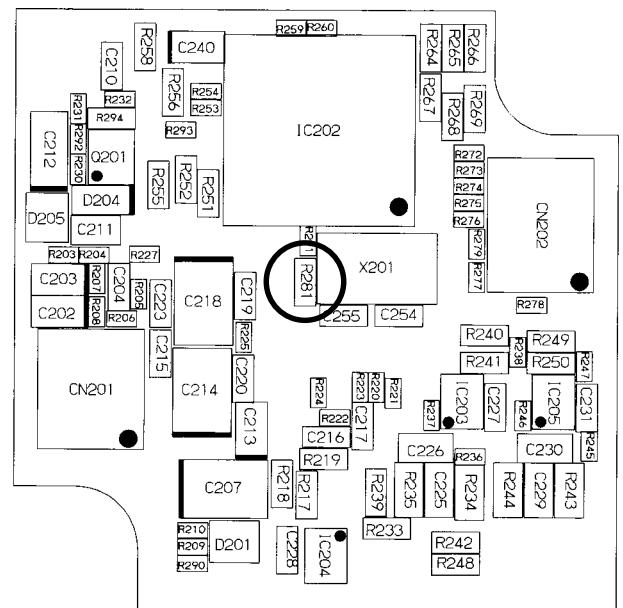
Change the following chip parts for external sync operation.

Sync system	R280	R281	R282	R284	Factory setting
Internal	100 $\Omega$	Absent	Absent	0 $\Omega$	
External	Delete	0 $\Omega$	100 $\Omega$	Delete	

0  $\Omega$  : Part code RME1784  
 Type ERJ3GEYJ0R00V  
 100  $\Omega$  : Part code RME1797  
 Type ERJ3GEYJ101V



(Main board side A)



(Main board side B)

Location of chip resistors

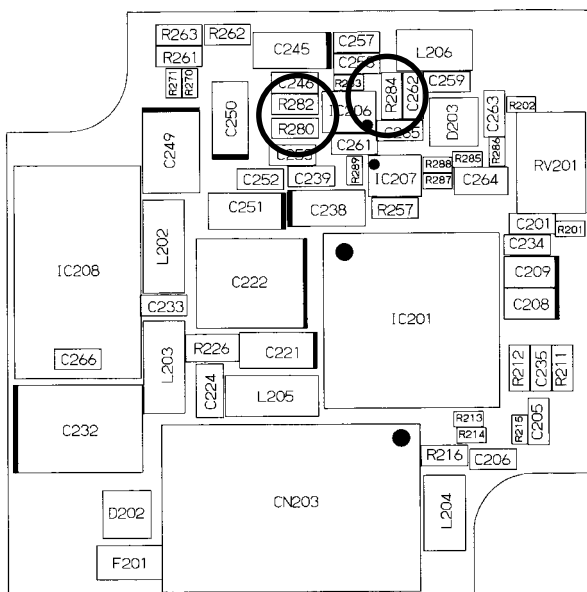
### 11-6 BE-IR31 internal sync

The BE-IR31 factory setting is for external sync. If required, this can be changed to internal sync by changing chip parts.

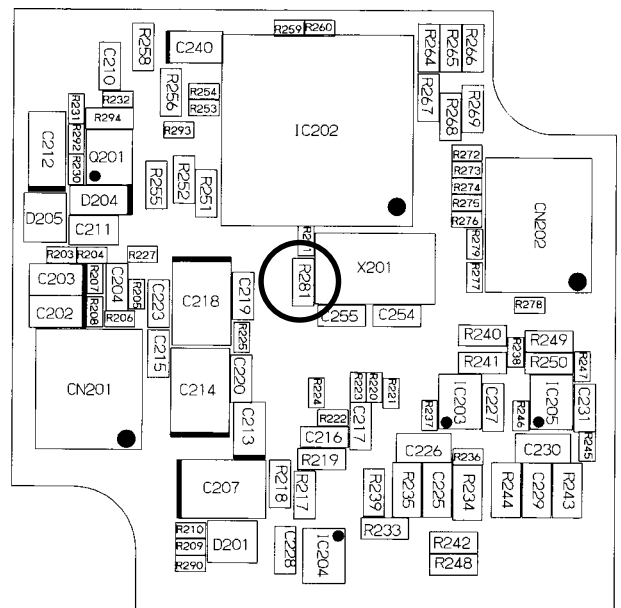
Change the following chip parts for internal sync operation.

Sync system	R280	R281	R282	R284	Factory setting
External	Absent	0 $\Omega$	100 $\Omega$	Absent	
Internal	100 $\Omega$	Delete	Delete	0 $\Omega$	

0  $\Omega$  : Part code RME1784  
 Type ERJ3GEYJ0R00V  
 100  $\Omega$  : Part code RME1797  
 Type ERJ3GEYJ101V



(Main board side A)



(Main board side B)

Location of chip resistors

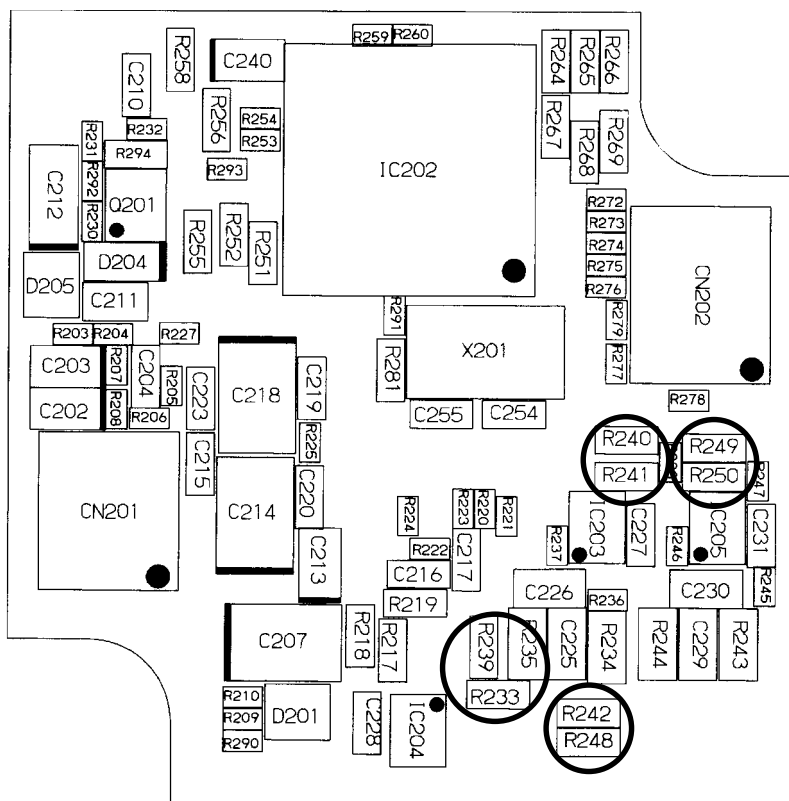
## 11. Function setting and changes

### 11-7 HD and VD output (BE-IR30 only)

The BE-IR30 can be provided with horizontal and vertical drive outputs by changing chip parts. Change the following chip parts to provide HD and VD outputs.

	R233	R239	R240	R241	R242	R248	R249	R250
Factory setting	0 $\Omega$	Absent	0 $\Omega$	Absent	0 $\Omega$	Absent	0 $\Omega$	Absent
HD & VD output	Delete	0 $\Omega$	Delete	0 $\Omega$	Delete	0 $\Omega$	Delete	0 $\Omega$

0  $\Omega$  :      Part code      RME1784  
                  Type            ERJ3GEYJ0R00V



Connector pin assignments after change

Pin No.	Signal
1	Video out
2	Video GND
3	GND
4	+9V
5	HD out
6	VD out
7	HD/VD GND

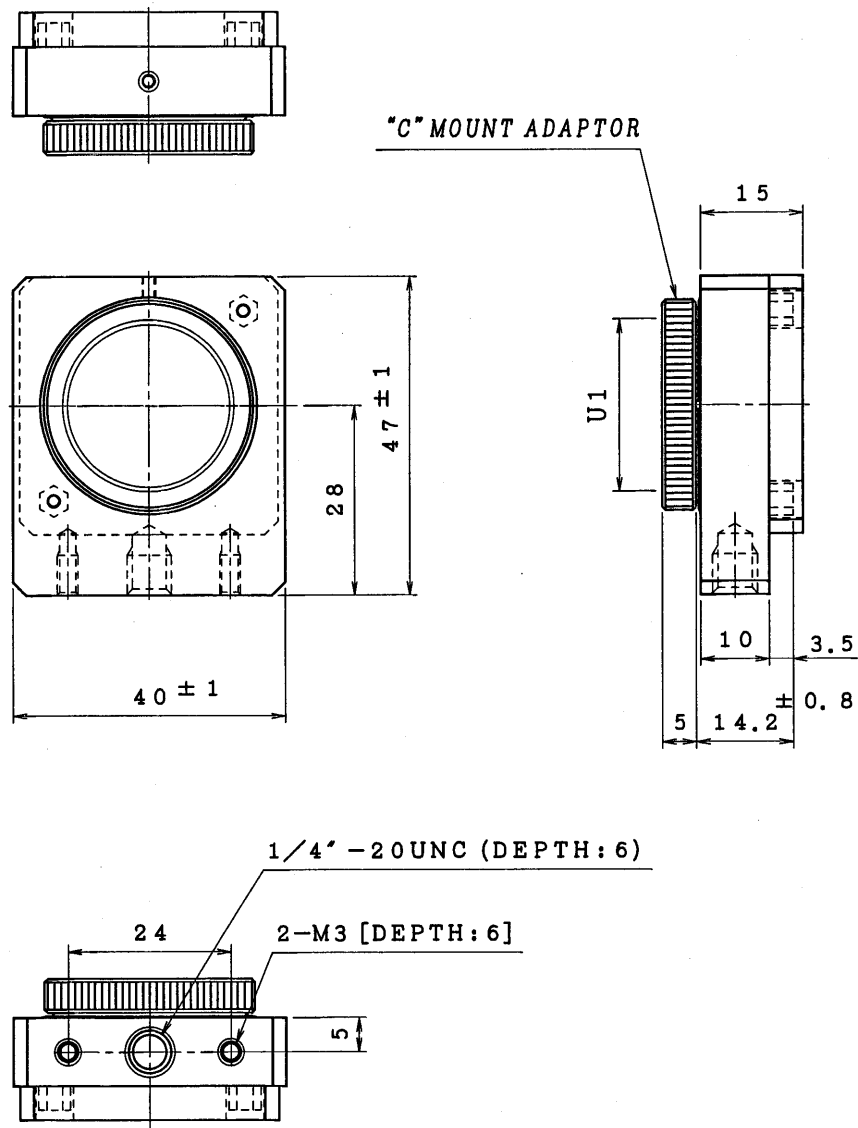
**Note:** The accessory cable cannot be used for signal outputs.

Location of chip resistors(Main board side B)

## 12. Options

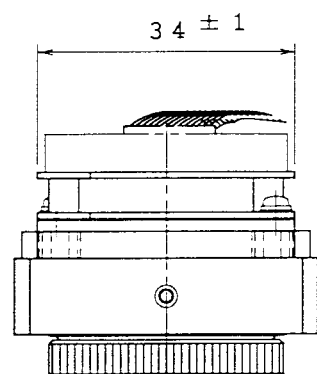
### LA-IR20 Mount adapter dimensions

MASS : APPROX. 60 g

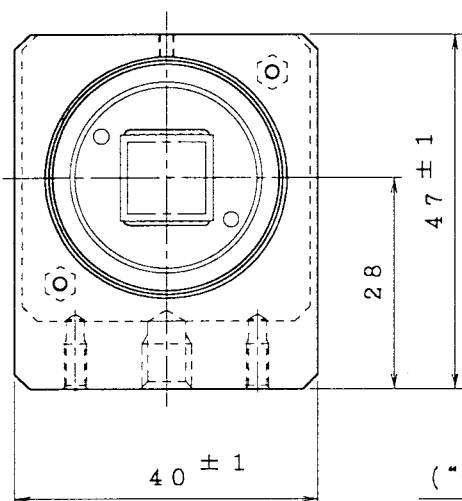


Remove c-mount attachment to use as cs-mount.

## BE-IR30A/31A and LA-IR20 combined dimensions



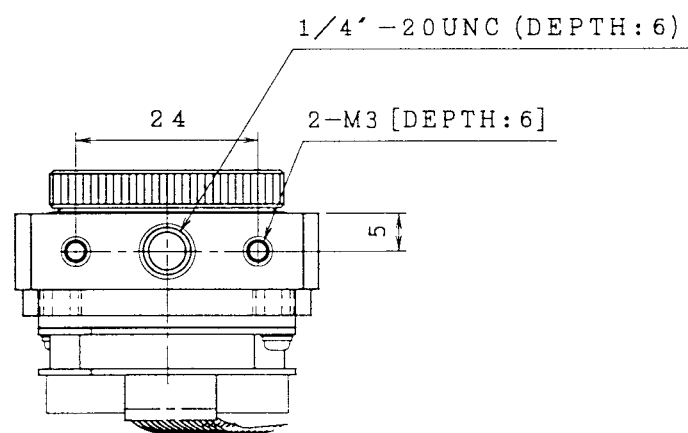
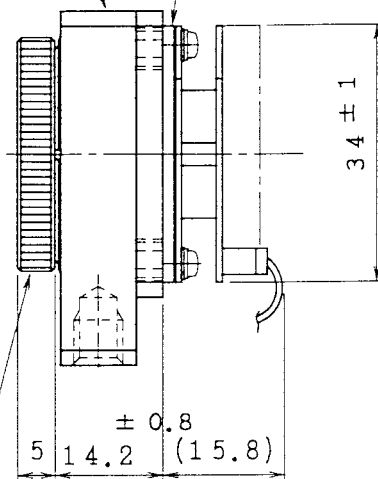
MASS : APPROX. 73 g  
( WITHOUT CABLE ASSY. )



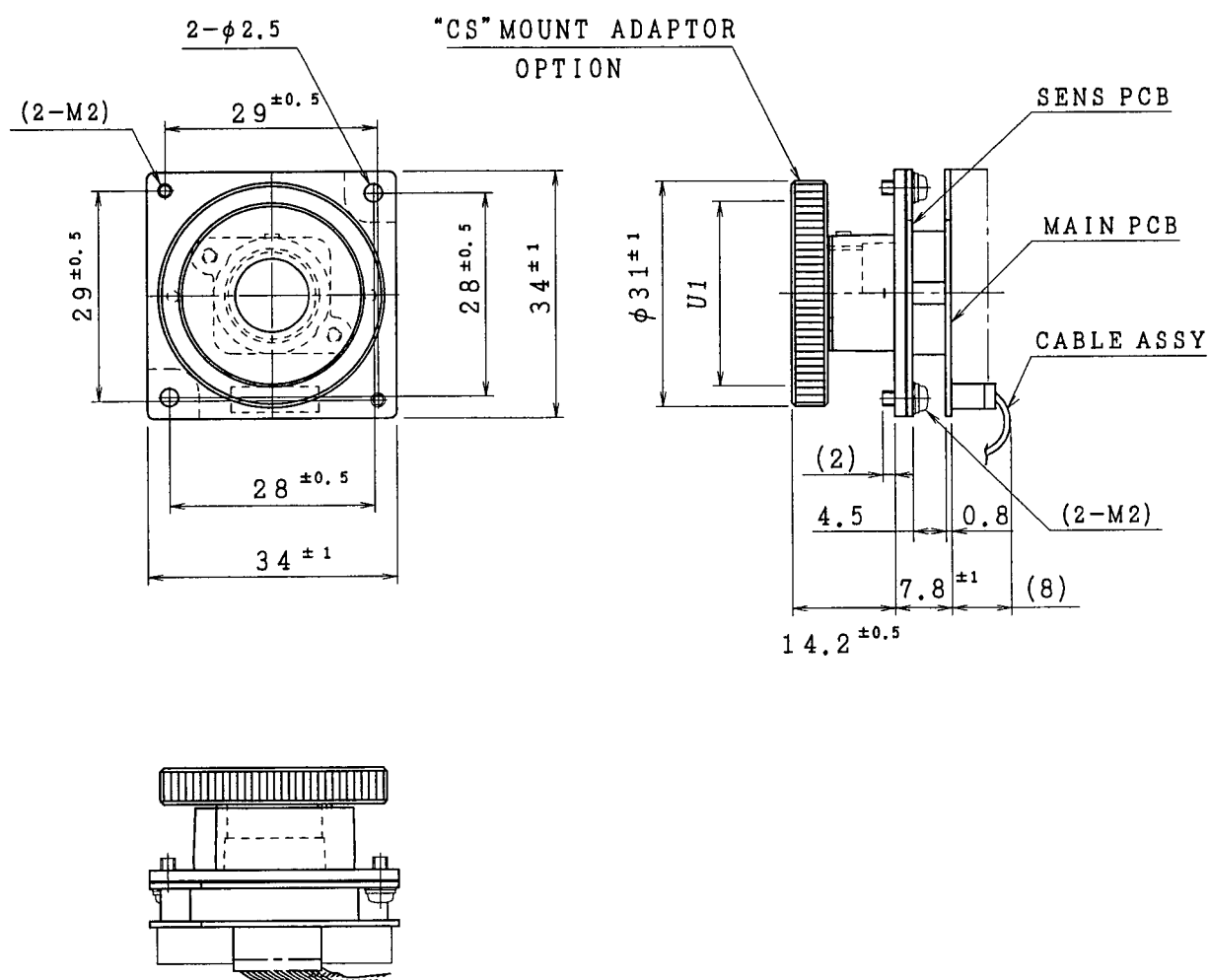
MOUNT ADAPTOR  
( OPTION )

BOARD CAMERA  
( BE-IR30 )

( "C" MOUNT ADAPTOR )

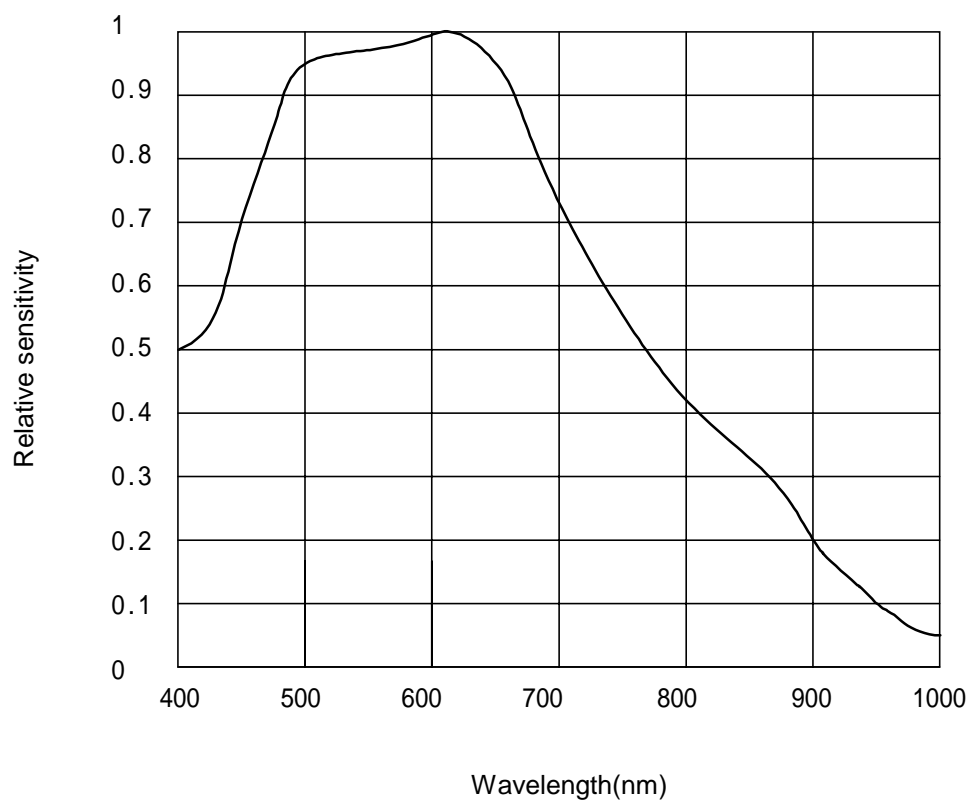


BE-IR30C/31C and CS mount adaptor (option) combined dimensions





### Spectral sensitivity (typical example)



Caution	
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The specifications of this equipment are subject to change without notice for improvement.

Prior to placing your order , be sure to confirm that these specifications are the latest ones.

Hitachi Denshi guarantee that the equipment shipped from our factory conforms to the Hitachi Denshi's standard warranty conditions and perform quality control within the range necessary to perform the warranty.

Warranty and After-sales Service	
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- (1) The guarantee period is one year after the date of purchase. However , the defects due to erroneous use or intentional act are excluded.
- (2) As the defect after expiration of the guarantee period , Hitachi Denshi will repair the equipment if the intended function is restored by the repair work , and the cost is changed to a customer.
- (3) Hitachi Denshi is not liable for the losses caused when the equipment is used in a system used for business trades , production process , medical fields , crime prevention applications , etc.
- (4) The parts used in the equipment have their respective lives. The lives of such parts will be shortened under the environments of high temperature or high humidity. When the stable operation is required for a long time , it is recommended to perform periodical maintenance and inspection every year or every two years.

Dec 27 2000

Jul 24 2000

Dec 9 1999

Aug 5 1999